

EXHIBIT CC

From: Jayshree Ullal [jayshree@aristanetworks.com]
Sent: 7/13/2009 11:00:40 PM
To: Kenneth Duda [kduda@aristanetworks.com]; Andreas Bechtolsheim [avb@aristanetworks.com]; David Cheriton [cheriton@cs.stanford.edu]
Subject: Fwd: 7148SX testing at Spirent this week

This was an eye opening experience and some valuable lessons learned on how our product need to mature in terms of more performance and feature test
David is a long time friend and very balanced
But clearly we need to do more to be ready for mainstream

Begin forwarded message:

From: David Newman <dnewman@networktest.com>
Date: July 10, 2009 3:47:19 PM PDT
To: Anshul Sadana <asadana@aristanetworks.com>, Sean Hafeez <sahafeez@aristanetworks.com>, 'Masum Mir' <masum.mir@aristanetworks.com>
Subject: 7148SX testing at Spirent this week

I've already sent Sean complete test results and configs but also wanted to offer some comments about testing this week. Sorry this goes on a bit, but I wanted to offer as much detail as possible.

First off, thanks VERY much to Sean, Masum and many other talented engineers for their support on this project. We found Arista bugs, we found Spirent bugs, but their competence and diligence made this project a pleasure to work on.

Overall, I'd say the 7148SX is a young product, not yet ready for public magazine testing, but a lot closer than many other "first efforts" I've tested (and closer than many other folks' fourth or fifth efforts).

In particular we saw some new issues related to testing on this scale. I didn't ask, but I got the impression the 7148SX previously had not undergone tests with 48 10G ports and large numbers of flows, especially for multicast traffic.

One area of concern is moving heavy loads of data-plane traffic across all ports, stressing the lanes between multiple switch chips. Certainly this problem is not unique to Arista but higher throughput with the 24-port device suggests that hashing of traffic between chips may be a bottleneck.

Multicast scalability and stability also are areas of concern. Group

capacity was lower in this test than in previous tests (644 vs. >1200) because the larger number of subscriber ports put a heavier burden on the processor and IGMP snooping logic.

More seriously, an attempt to join 1,012 groups caused almost all switch processes to restart, and the switch ports to come back in disabled mode. Given strong interest in multicast among financial services customers, IGMP snooping is an obvious candidate for optimization.

Here are some comments on individual tests. These comments leave out much detail about debugging efforts. If a test isn't listed here it's because we did not get to it within the allotted four-day test window:

L3 UNICAST TPUT, LATENCY (USING STATIC ROUTES)

Throughput was substantially lower for 64- and 9216-byte frames (equivalent to 25 and 93 percent of line rate respectively) than in the L2 switching tests. Note that an offered load of 25 percent represents the highest load with zero packet loss, per RFCs 1242/2544. It does not mean the switch dropped 75 percent of packets.

Tests also uncovered scalability and stability issues with the ARP cache. EOS currently uses the Linux limit of 1024 ARP entries. Since these tests used more hosts (initially around 12k, later reduced to 2976), the limit had to be manually increased in the /proc table. But ARPing also revealed a stability concern: The ARP table crashed when offered 12k ARP requests.

L2 UNICAST TPUT, LATENCY

Throughput was line rate for all frame sizes except 64 bytes and latency was in line with expectations. With 64-byte frames the 7148SX consistently lost between 1 and ~20 frames out of billions offered. The 24-port switch did run at line rate, suggesting a possible bottleneck in connections between switch chips.

L2 AGGREGATED MULTICAST THROUGHPUT

The switch crashed (all processes but one restarted) when attempting to run this test with 1012 groups. Most subsequent efforts in multicast testing focused on debugging ARP behavior and measuring group capacity and join/leave delay.

L2 MIXED-CLASS THROUGHPUT

With a 40/60 mix of 256-byte multicast/1518-byte unicast frames, the switch forwarded all traffic at line rate with 368 groups involved.

L2 MULTICAST GROUP JOIN/LEAVE DELAY

With 256 groups, transmitters on 1 port and subscribers on 46 ports,

average join delay was around 700 ms and maximum delay exceeded 5 seconds. This is far higher than the average delay of roughly 40 ms in previous tests, probably explained by the much larger number of subscriber ports in this test (46, vs. 8 previously).

L2 MULTICAST GROUP CAPACITY

With transmitters on 1 port and subscribers on 46 ports, the switch successfully built an IGMP snooping table for 644 groups and forwarded traffic to all groups per RFC 3918. Attempts to join larger numbers of groups either crashed all processes or swamped CPU resources.

CLI USABILITY

The system is a very close clone of the IOS CLI. This is a major plus for the majority of customers who have already Cisco-trained staff. The bash/Unix extensions are also quite powerful.

In features assessment, there are two other areas of possible concern with regard to security. First, a shell gives users a lot of rope. I don't know if, for example, users can delete critical files or install enough packages to cause resource contention. At minimum, it seems like a potential support headache. Then again, "you do this, you're on your own" isn't a particularly compelling story either if Arista advertises extensibility as a plus. Perhaps something akin to BSD jails would give users a sandbox to play in but limit the damage they can do.

Second, I understand the 7148SX does not yet support access control lists. ACL support isn't particularly meaningful in a pure data center top-of-rack switch. But as Arista grows as an enterprise contender ACL support, including support for dynamic ACL assignment in conjunction with 802.1X, will be a must. Virtually all major switch makers except Force10 support this.

Thanks again for your support on this project. Please let me know if you have any questions, and I look forward to working together again soon.

Regards,
David Newman
Network Test

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Jayshree V Ullal
President & CEO, Arista Networks

Leader in Cloud Networking www.aristanetworks.com

Email: jayshree@aristanetworks.com

275 Middlefield Road, Menlo Park, Ca 94025

Phone: (650) 462 5027

United States District Court
Northern District of California

Case No. 14-cv-05344-BLF

Case Title Cisco Systems v. Arista Networks

Exhibit No. 278

Date Entered _____

Richard W. Wieking, Clerk

By: _____, Deputy Clerk

π PLAINTIFF π